

Installation, Operation and Maintenance Manual

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage!

Constant Pressure Control

Constant pressure control is a packaged system specifically designed to control a fan with a Vari-Green motor. The controller has two major modes; controlling pressure on the fan inlet, exhaust control; and controlling pressure on the fan outlet, pressurization control. Exhaust control has a cutout feature that shuts off the fan when there is no demand on the system. In both modes closing an override input sets the fan to a constant speed.

The system includes a fan with Vari-Green motor, pressure tap, and controller. The system is designed with considerations for lint laden air. Performance ranges from 500-3000 CFM and up to ± 1 inch of pressure. Fan models available are G, CUE, CW, and SQ. Each system shall bear a manufacturer's nameplate.



General Safety Information

Only qualified personnel should install this product. Personnel should have a clear understanding of these instructions and should be aware of general safety precautions. Improper installation can result in electric shock, possible injury due to coming in contact with moving parts, as well as other potential hazards. Other considerations may be required if high winds or seismic activity are present. If more information is needed, contact a licensed professional engineer before moving forward.

Follow all local electrical and safety codes, as well as the National Electrical Code (NEC) and the National Fire Protection Agency (NFPA). Where applicable, follow the Canadian Electric Code.

1. The rotation of the wheel is critical. It must be free to rotate without striking or rubbing any stationary objects.
2. Motor must be securely and adequately grounded.
3. Do not spin fan wheel faster than maximum cataloged fan RPM. Adjustment to fan speed significantly affects motor load. If fan RPM is changed, motor current should be checked to make sure it is not exceeding the motor nameplate amps.
4. Do not allow the power cable to kink or come in contact with oil, grease, hot surfaces, or chemicals. Replace cord immediately if damaged.
5. Verify that the power source is compatible with the equipment.
6. Never open access doors to a duct while the fan is running.

DANGER

Always disconnect, lock and tag power source before installing or servicing. Failure to disconnect power source can result in fire, shock or serious injury.

CAUTION

When servicing the fan, motor may be hot enough to cause pain or injury. Allow motor to cool before servicing.

CAUTION

Precaution should be taken in explosive atmospheres.

Receiving

Upon receiving the product check to make sure all items are accounted for by referencing the bill of lading to ensure all items were received. Inspect each crate for shipping damage before accepting delivery. Notify the carrier if any damage is noticed. The carrier will make notification on the delivery receipt acknowledging any damage to the product. All damage should be noted on all the copies of the bill of lading which is countersigned by the delivering carrier. A Carrier Inspection Report should be filled out by the carrier upon arrival and reported to the Traffic Department. If damaged upon arrival, file a claim with carrier. Any physical damage to the unit after acceptance is not the responsibility of Greenheck Fan Corporation.

Unpacking

Verify that all required parts and the correct quantity of each item have been received. If any items are missing, report shortages to your local representative to arrange for obtaining missing parts. Sometimes it is not possible that all items for the unit be shipped together due to availability of transportation and truck space. Confirmation of shipment(s) must be limited to only items on the bill of lading.

Handling

The motor amperage and voltage ratings must be checked for compatibility to supply voltage prior to final electrical connection. Wiring must conform to local and national codes. Consult local code authorities for specific requirements.

Storage

Product is protected against damage during shipment. If the product cannot be installed and operated immediately, precautions need to be taken to prevent deterioration of the product during storage. The user assumes responsibility of the product and accessories while in storage. The manufacturer will not be responsible for damage during storage. These suggestions are provided solely as a convenience to the user.

Indoor Only

Do not store this product outdoors. The ideal environment for the storage of this product is indoors, above grade, in a low humidity atmosphere which is sealed to prevent the entry of blowing dust, rain or snow. Temperatures should be evenly maintained between 30° to 110°F (-1° to 43°C) (wide temperature swings may cause condensation and “sweating” of metal parts). All accessories must be stored indoors in a clean, dry atmosphere.

Remove any accumulations of dirt, water, ice, or snow and wipe dry before moving to indoor storage. Allow cold parts to reach room temperature to avoid “sweating” of metal parts. To dry parts and

packages, use a portable electric heater to get rid of any moisture buildup. Leave coverings loose to permit air circulation and to allow for periodic inspection. The unit should not be stored on the floor.

Inspection and Maintenance During Storage

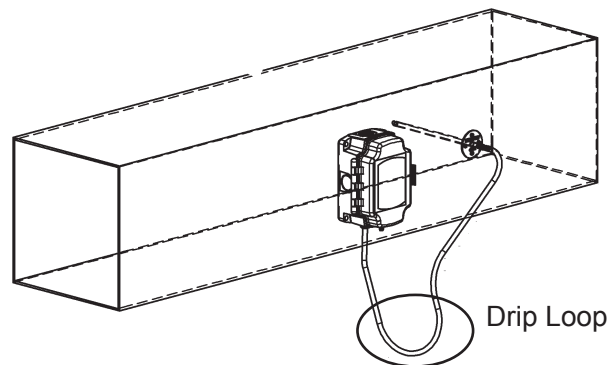
While in storage, inspect product once per month. Keep a record of inspection and maintenance performed. If moisture or dirt accumulations are found on parts, the source should be located and eliminated.

Installation and Setup Guide

This guide provides instructions for how to install, wire and program the control system for use when constant pressure in a duct or room system is required. This does not cover ductwork recommendations or other considerations. When installed, this control system will automatically vary the speed of the fan to maintain a constant pressure within the system.

Parts Needed (Not provided by Greenheck)

- 18 - 20 gauge 3-wire plenum rated control wire
- 1/4 inch inside diameter plastic tubing
- Normally Open switch or relay for optional remote override

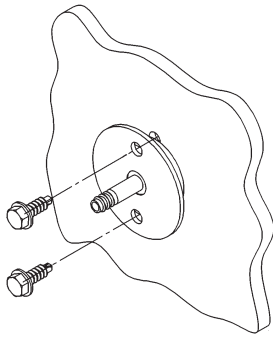


Pressure Taps

Either room or duct pressure taps may be used. Be sure to mount them in the room or duct system you intend to control.

Be careful not to pinch or kink the pressure tubing anywhere along its length.

Condensation running down the interior of the pressure tubing may damage the controller's sensor. Forming a drip loop in the tubing just before it enters the Greenheck Constant Pressure Controller is good practice. (The distance from the bottom of the loop to the controller's pressure port should be one to two inches [2.5 to 5 cm] greater than the highest static pressure, including error conditions, in the system.)

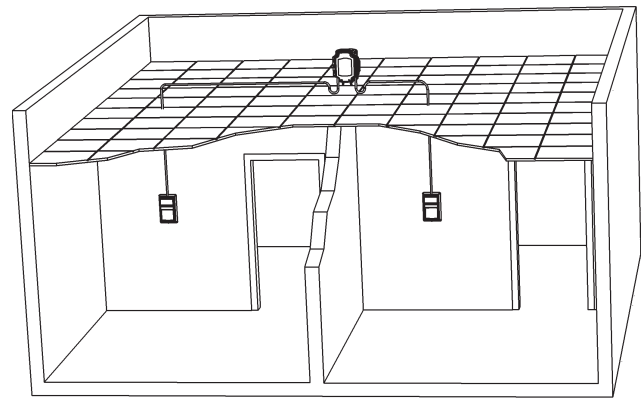
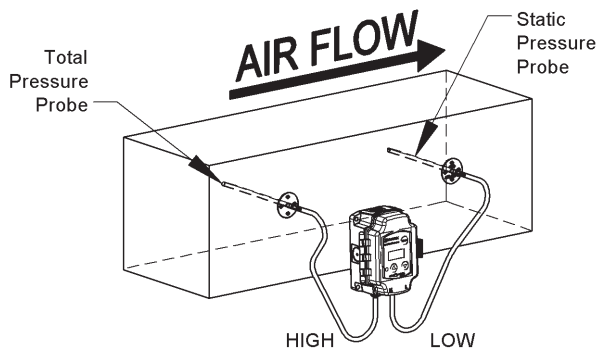


Duct Pressure Tap

Positioning the duct pressure tap to get the best results depends on the layout of the system. For stacked systems, locate the pressure tap 1/3 of the way from the bottom of the duct.

Select a location on the duct that is a minimum of 1.5 duct diameters upstream or downstream from any dimensional change, elbow, damper or other obstruction. The mounting location should be towards the top of horizontal run duct to prevent condensation from entering the tube. On rectangular duct mount the pressure tap away from the corners. Remove any exterior insulation; insulation may be replaced after installation.

1. Drill a 3/8" hole in the duct where pressure tap is to be installed.
2. Place the 6" tube into the hole and move the mounting base up to the duct. Orientation does not matter.
3. For round duct rotate the tap so the mounting holes contact the duct
4. Using the supplied self drilling zip screws, attach the duct pressure tap to the duct compressing the gasket evenly.
5. Connect tubing from the barbed port to the pressure controller.
6. When a total and static probe are used to measure velocity pressure, mount the pressure taps as shown in the diagram below. Be sure to orient the total pressure tap in the direction of airflow. Select a location in the ductwork that is at least 5 duct diameters from any elbows, dampers, transitions or diffusers.

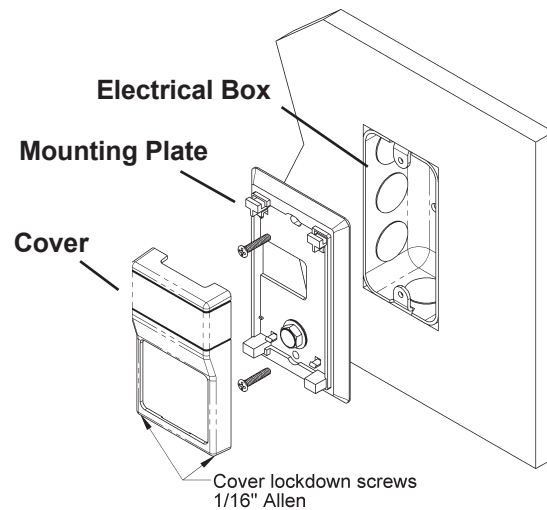


Room Pressure Tap

Mount the static pressure pickup port in an area that is representative of the zone near the center of the zone. Do not mount in a closet or other enclosed space that is in the zone being monitored. Avoid mounting locations in areas that are prone to drafts.

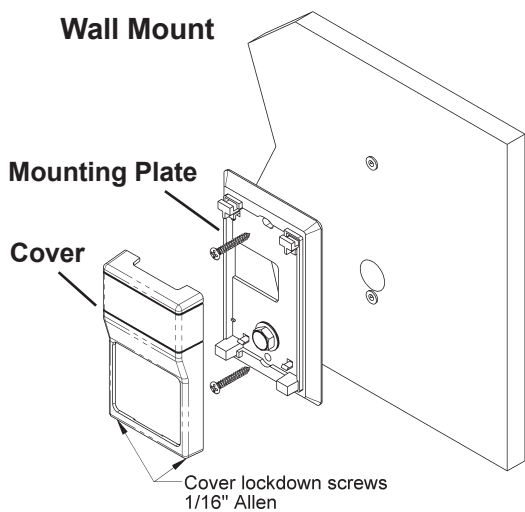
It is best to mount the wall static pressure pickup port using an electrical box. A simple hole in the wallboard may be used, but in any case be sure that the foam gasket on the back of the pickup seals tightly against the wall

Electrical Box Mount



Electrical Box

1. Using a 1/16" Allen wrench, separate the mounting base and the cover by driving in the 1/16" Allen screws until the cover comes free. Driving the screws in prevents you from losing them.
2. Pull the pressure tubing through the wall and out of the junction box, leaving about two inches free.
3. Secure the pressure tubing to the pressure fitting.
4. Secure the base to the box using the #6-32 x 3/4 inch mounting screw provided.
5. Attach cover by latching it to the top of the base, rotating the cover down and snapping it into place.
6. Secure the cover by backing out the lock-down screws using a 1/16" Allen wrench until they are flush with the bottom of the cover.



Wall Mount

- Using a 1/16" Allen wrench, separate the mounting base and the cover by driving in the 1/16" Allen screws until the cover comes free. Driving the screws in prevents you from losing them.
- Drill a 3/4" hole in the drywall to relieve the pressure fitting where the pressure tap is to be installed.
- Place the mounting base pressure fitting in the 3/4" hole and align the mounting base to the wall.
- Using a pencil, mark out the two mounting holes on the wall.
- Drill two 3/16" holes in the center of each marked mounting hole. Insert a drywall anchor into each hole.
- Pull the pressure tubing through the wall and out of the 3/4" hole, leaving about two inches free.
- Secure the pressure tubing to the pressure fitting.
- Secure the base to the drywall anchors using the #6 x 1 inch mounting screws provided.
- Attach Cover by latching it to the top of the base, rotating the cover down and snapping it into place.
- Secure the cover by backing out the lock-down screws using a 1/16" Allen wrench until they are flush with the bottom of the cover.

Constant Pressure Control

- The Constant Pressure Control contains an integral pressure transducer.
- Mount the Constant Pressure Control box in an accessible location as close as possible to the pressure tap and fan. Keep wiring lengths between the Constant Pressure Control and the fan to 200 feet or less. Keep pressure tubing lengths between the Constant Pressure Control and the pressure taps to 100 feet or less.
- Mount the Constant Pressure Control in the vertical position with the tubing connectors in the down position.
- One Duct Tap** – Maintains constant pressure in duct based upon space pressure where the Constant Pressure Control is mounted – Connect the "H" tubing connector on the Constant

Pressure Control to the pressure tap using 1/4-inch tubing. The "L" tubing connector remains open to atmosphere.

- One Duct Static Tap and One Duct Total Tap** – Maintains a constant velocity pressure in a duct. This allows the system to automatically adjust the airflow in a system to compensate for filter or coil loading. Connect the "H" tubing connector on the Constant Pressure Control to the total pressure tap and connect the "L" tubing connector to the static pressure tap using 1/4" tubing. The resultant measurement will be velocity pressure.

- System Balancing** – The Constant Pressure Controller can maintain a velocity pressure from 0 to 1". To balance the system, calculate the velocity pressure required for the system based on the intended CFM and duct area:

$$V_p = \left(\frac{CFM}{A \cdot 4005} \right)^2 \quad \text{Where A is the duct area in ft}^2.$$

Set parameter P11=0 and parameter P01 (the pressure setpoint) to the desired velocity pressure. If airflow verification is needed, external CFM measurements can be taken and the velocity pressure can be adjusted until the desired airflow is achieved.

- One Room Tap** – Maintains constant pressure in a room based upon space pressure where the Constant Pressure Control is mounted – Connect the "H" tubing connector on the Constant Pressure Control to the pressure tap using 1/4-inch tubing. The "L" tubing connector remains open to atmosphere.
- Two Room Taps** – Maintains a constant differential pressure between two rooms, allowing the Constant Pressure Control to be mounted in a remote location - Connect the "H" tubing connector on the Constant Pressure Control to the pressure tap in the high pressure room using 1/4-inch tubing. Connect the "L" tubing connector on the Constant Pressure Control to the pressure tap in the low pressure room using 1/4-inch tubing.
- Make sure the tubing is not kinked or punctured.

Wiring

See diagram on page 7 for wiring overview.

- Control Box to Factory Mounted Transformer Control Input

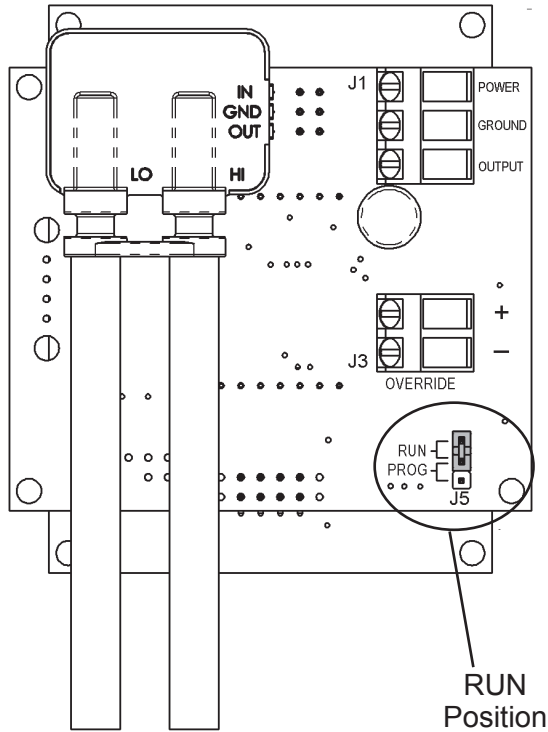
| | Controller Terminal | Transformer Control Input |
|----------------------------|---------------------|---------------------------|
| Low-voltage control wiring | J1 - POWER | to 24V |
| | J1 - GROUND | to COM |
| | J1 - OUTPUT | to 0-10V |

- Optional Remote Override:

Connect a normally-open switch between terminals J3+ and J3- on the controller. Closing this switch will activate the remote override feature. Opening the switch will de-activate the override.

Controller Operation

The Constant Pressure Control has three buttons accessible through the lid: Enter, Up or Increase (▲), and Down or Decrease (▼). Additionally on the circuit board inside the lid is jumper J5. J5 is used to set the controller into normal operation, RUN, or programming mode, PROG.



Normal Operation (J5 = RUN)

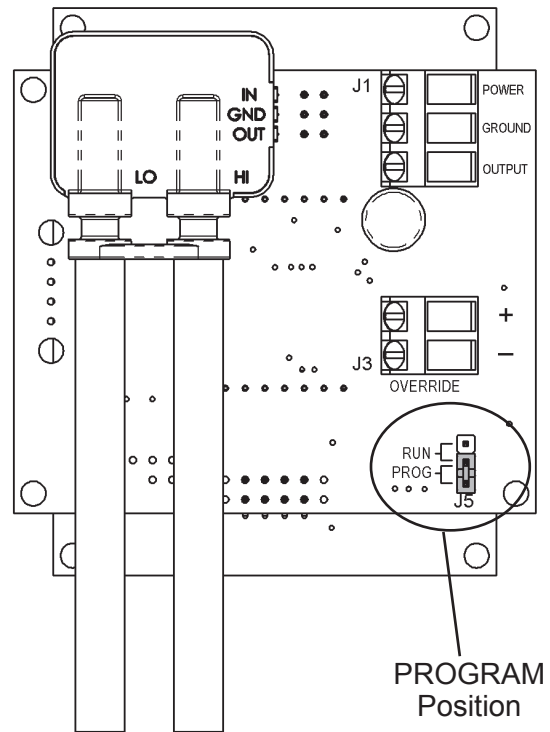
The Constant Pressure Control ships from the factory to control pressure on the inlet of the fan with a setpoint of -0.10 inches of water pressure, the display showing real time duct pressure in inches of water and the cutout disabled. Pressing the buttons on the controller lid will show the following for 10 seconds;

- Enter, LED color Cyan, Cutout percent stored in parameter P06
- Up/Increase, LED color Yellow, Setpoint pressure stored in parameter P01.
- Down/Decrease, LED color Green, Real time output voltage in percent.

Note: If Display Units parameter P04 is set to 0, then the normal display will show real time output voltage in percent and pressing the Down/Decrease button will display real time duct pressure.

Pressure Display

The pressure display reads in engineering units. The display will only indicate pressures from 1.00 to -1.00 inches of water. If the pressure is above 1.00 or below -1.00 inches of water then, the display will flash the 1's digit.



Programming (J5 = PROG)

Programming allows the user to customize the operation on the Constant Pressure Control. The color of the LED is red during programming mode. If power to the controller is lost, all settings will be retained.

General Programming

- Place the J5 jumper on the PROG position, LED = Red
- During programming, output to fan is disabled
- The display will read P01
- Press the Up/Increase or Down/Decrease button to change the parameter number
- Press the enter button to edit the parameter
 - Press the Up/Increase or Down/Decrease button to change the parameter. Pressing and holding the button will scroll the numbers
 - Press the Enter button to save the change
- The display will read the parameter number just edited
- Continue until all the parameters needing editing are completed
- Always stop with a parameter number showing
- Place the J5 jumper on the RUN position, LED = Green

Parameter Descriptions

| Parameter | Description | Default Setting |
|-----------|------------------------------|-----------------------|
| P01 | Pressure Set Point | -0.10 inches of water |
| P02 | Auto Zero | 0 (see below) |
| P03 | Factory Defaults | 0 (see below) |
| P04 | Display Units | 1 (inches of water) |
| P05 | Algorithm Gains | 0 (factory gains) |
| P06 | Cutout Percent | 20% |
| P07 | Cutout Delay Timer | 30 seconds |
| P08 | Override Output Percent | 100% |
| P09 | Pressure Input Filter | 0 seconds |
| P10 | Start Up Timer | 10 seconds |
| P11 | Fan-Inlet/Fan-Outlet Control | 1 (fan inlet control) |

Pressure Set Point, Parameter P01

Factory Default = -0.10 inches of water.

-1.00 to 1.00 inches of water in increments of 0.01 inches.

Auto Zero, Parameter P02

Factory Default = 0

0 = entry condition

1 = Perform Auto Zero

Auto zero sets the zero pressure reading of the controller. Greenheck recommends performing auto zero after installation and before first operation.

Place a piece of tubing from tubing connector “H” to tubing connector “L”. Set value to 1 and press the Enter button. The LED will turn white. Auto zero is complete when the LED turns red. Remove the tubing from the tubing connectors and reconnect the pressure tap.

Factory Defaults, Parameter P03

Factory Default = 0

0 = entry condition

1 = Set all parameters to the factory default setting

Display Units, Parameter P04

Factory Default = 1

0 = Normal display is output percent

1 = Normal display is inches of water

Algorithm Gain, Parameter P05

Factory Default = 0

0 = Factory gains

1 = Gain set A

2 = Gain set B

If gain set 0 does not achieve stable operation use one of the other sets to achieve stable operation.

Cutout Percent, Parameter P06 (Fan inlet control only)

Factory Default = 20%

20% = Cutout disabled, fan on continuously.

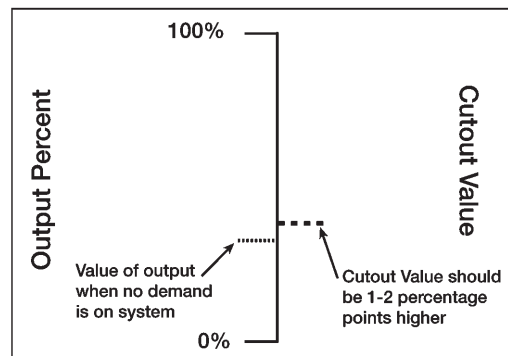
20% to 100% in 0.1% increments

The cutout feature can only be used if the system utilizes powered fans such as bathroom fans or dryers. It will not function properly if passive devices are installed in the system such as motorized dampers.

The cutout percent needs to be set if you would like the exhaust fan to turn off when there is no demand on the system. The default value is set at 20%. If the exhaust fan is required to operate at all times, leave the cutout percent value at 20%.

When the output percent is less than the cutout percent, the cutout timer is activated (The timer value is in parameter P07). After the time has elapsed, the fan will shut off.

Note: A cutout percent value is only valid for a discreet pressure set point. When the pressure set point is changed, the cutout percent value must be adjusted as well. It is recommended that you make sure your pressure set point is correct before continuing.



To set the cutout percent value, the following steps need to be followed:

- Set normal operation and verify the system is maintaining the desired pressure set point with no other equipment (dryers, bathroom fans, etc.) operating.
- After the pressure has stabilized at the set point, press the Down/Decrease button to show the percent output voltage. Take note of this value. (The value will fluctuate slightly within +/- 2%. A mental average will be adequate.)
- The recommended Cutout Value is 1-2 percentage points above the value you noted in the previous step. See above for a graphical representation.

When the system is running and the output percent is less than the cutout value, the LED will flash. After the cutout time has elapsed, the fan will turn off. When the fan turns off, the display will show “OFF” and the LED will flash.

One of two things must happen for the system to return to normal operating mode:

- The controller will sense when a dryer, bathroom fan, etc. is turned on and will vary the exhaust fan speed appropriately.
- If for some reason the system needs to be manually awakened from cutout mode, hold the Enter button for 5 seconds and the system will return to normal operating mode.

If the controller will not shut the fan off, verify that the cutout value is correct and that the timer has started by looking for the flashing LED. If the flashing LED is not displayed, then the cutout value needs to be adjusted. Remember the cutout value should be set when there is no demand on the system.

If the controller shuts the fan off when there is demand on the system, the cutout value is too high. Lower the value and observe the operation of the system.

Cutout Delay Timer, Parameter P07

Factory Default = 30 seconds

0 to 100 seconds in 1 second increments

See parameter P06 for operational details.

Override Output Percent, Parameter P08

Factory Default = 100%

20% to 100% in 1% increments

During normal operation, when the remote override switch is closed, the fan will immediately ramp

to P08% speed and stays there until the remote override switch is opened. The override can be activated by any normally-open voltage-free contact. Closing the contact will activate the override.

The LED will turn red and the display will show Ovr when the override switch is closed.

Pressure Input Filter, Parameter P09

Factory Default = 0 seconds

0 = No Filter

0 to 10 seconds in 1 second increments

Pressure filter time constant. Set higher than zero if wind gusts interfere with stable operation.

Start Up Timer, Parameter P10

Factory Default = 10 seconds

10 to 30 seconds in 1 second increments

At power up, set the output to 2 VDC for the time in parameter 10, then resume algorithm control.

Fan-Inlet/Fan-Outlet Control, Parameter P11

Factory Default = 1, fan inlet control

0 = Fan Outlet Control

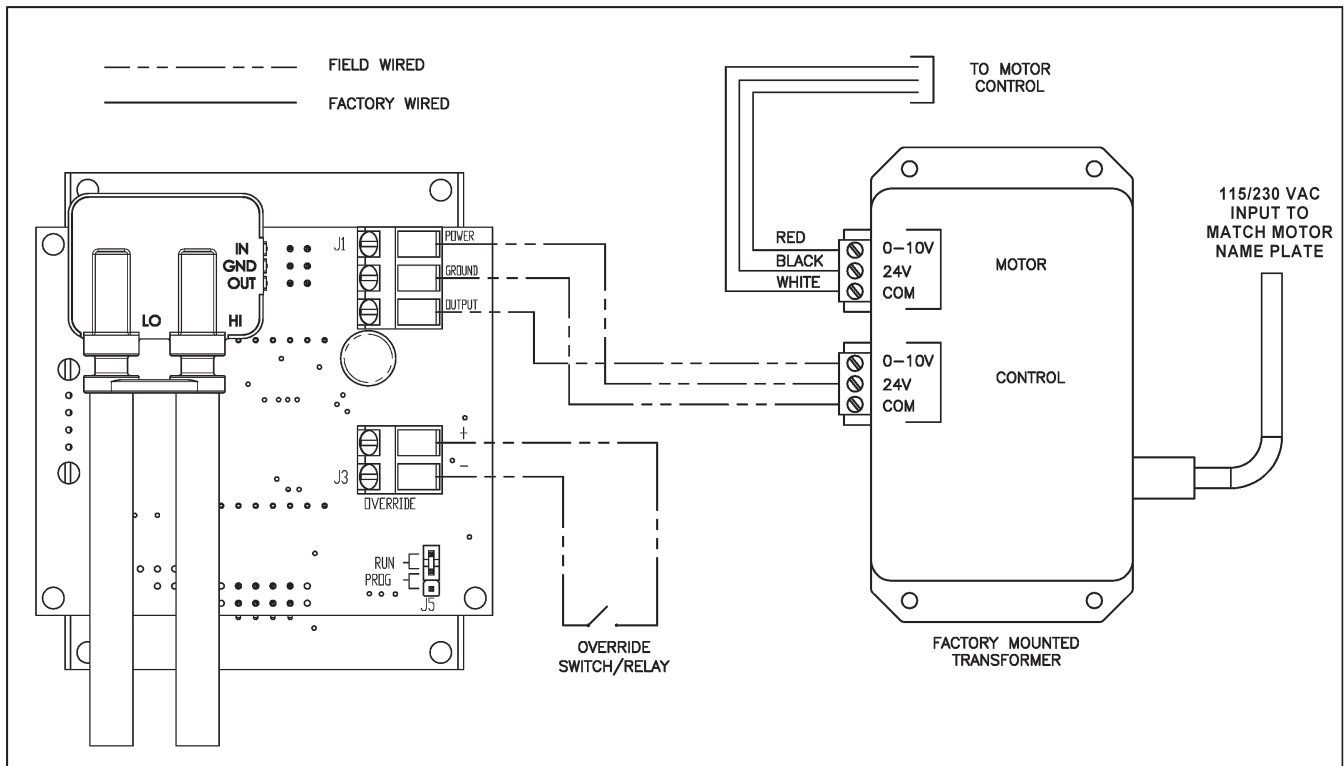
1 = Fan Inlet Control

The controller has two major modes; controlling pressure on the fan inlet, and controlling pressure on the fan outlet.

Exhaust fans use inlet control. Supply fans use outlet control. Inline fans may use either inlet or outlet control depending on the location of the tap.

If controlling velocity pressure, set P11=0.

Wiring Diagram



Troubleshooting

| Problem | Potential Solution |
|---------------------------------|--|
| Not holding setpoint pressure | <ul style="list-style-type: none"> • Check that pressure taps are a minimum of 1.5 duct diameters upstream or downstream from any dimensional change, elbow, damper or other obstruction. • Make sure there are no kinks or punctures in the tubing between the Constant Pressure Control and the pressure taps. |
| Fan Speed is unstable | <ul style="list-style-type: none"> • Make sure there are no kinks or punctures in the tubing between the Constant Pressure Control and the pressure taps. • Try algorithm gain set A or B. |
| Fan Cutout not working properly | <ul style="list-style-type: none"> • A cutout percent value is only valid for a discreet pressure set point. When the pressure set point is changed, the cutout percent value must be adjusted as well. It is recommended that you make sure your pressure set point is correct before continuing. • If the controller will not shut the fan off, verify that the cutout value is correct and that the timer has started by looking for the flashing LED. If the flashing LED is not displayed, then the cutout value needs to be adjusted. Remember the cutout value should be set when there is no demand on the system. • If the controller shuts the fan off when there is demand on the system, the cutout value is too high. Lower the value and observe the operation of the system. |

Warranty

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of one year from the shipment date. Any units or parts which prove defective during the warranty period will be replaced at our option when returned to our factory, transportation prepaid. Motors are warranted by the motor manufacturer for a period of one year. Should motors furnished by Greenheck prove defective during this period, they should be returned to the nearest authorized motor service station. Greenheck will not be responsible for any removal or installation costs.

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.



Greenheck Vari-Green Motor catalog provides additional information describing the equipment, fan performance, available accessories, and specification data.

AMCA Publication 410-96, Safety Practices for Users and Installers of Industrial and Commercial Fans, provides additional safety information. This publication can be obtained from AMCA International, Inc. at: www.amca.org.

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